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229. Proposed by B. F. YANNEY, Mount Union College, Alliance, O.

If $a_1^n + a_2^n + a_3^n + \dots + a_r^n = A^n$, $a_1^m + a_2^m + a_3^m + \dots + a_r^m >$ or $< A^m$, according as $m <$ or $> n$; provided all the letters stand for positive real numbers.

230. Proposed by G. W. GREENWOOD, M. A. (Oxon), Lebanon, Ill.

Find the value of the determinant of n rows,

$$\begin{vmatrix} 5 & 2 & 0 & 0 & 0 & \dots\dots\dots \\ 2 & 5 & 2 & 0 & 0 & \dots\dots\dots \\ 0 & 2 & 5 & 2 & 0 & \dots\dots\dots \\ 0 & 0 & 2 & 5 & 2 & \dots\dots\dots \\ 0 & 0 & 0 & 2 & 5 & \dots\dots\dots \\ \dots & \dots & \dots & \dots & \dots & \dots\dots\dots \end{vmatrix}$$

[Oxford, 1900.]

231. Proposed by O. L. CALLECOT, Omaha, Neb.

Sum to infinity: $\frac{1}{2.3.4} + \frac{1}{5.6.7} + \frac{1}{8.9.10} + \dots\dots\dots$

232. Proposed by F. P. MATZ, Sc. D., Ph. D., Reading, Pa.

If one person out of 50 die annually and one person out of 30 is born annually, how long at this rate would be required for the population to treble itself?

233. Proposed by J. J. KEYES, Fogg High School, Nashville, Tenn.

At what time between 10 and 11 o'clock is the second hand of a clock one minute space nearer to the hour hand than it is to the minute hand?

GEOMETRY.

254. Proposed by W. J. GREENSTREET, M. A., Editor of the *Mathematical Gazette*, Stroud, England.

Find the cartesian equation to a line that is both tangent and normal to the cardioid.

255. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Find the envelope of the straight line that connects the extremities of two conjugate diameters of an ellipse.

256. Proposed by F. P. MATZ, Ph. D., Sc. D., Reading, Pa.

The bisectors of the four angles of any quadrilateral intersect in four points, all of which lie on the circumference of the same circle.

CALCULUS.

194. Proposed by G. W. GREENWOOD, M. A. (Oxon), Lebanon, Ill.

Show that the volume of the solid generated by the revolution of a circle, less than a semi-circle, about the diameter parallel to the diameter of the circle, is equal to that of a sphere having a diameter equal to the chord; and hence that the volume is independent of the magnitude of the original circle, the length of the chord being known.